We claim:

1. A method of displaying a first image on a display device, the display device having a plurality of pixels, each pixel having a unique location on the display device, the method comprising:

assigning one of a plurality of sample patterns to each pixel on the display device, each pixel being assigned the one of a plurality of sample patterns based upon its unique location on the display device, each sample pattern having at least one sample location;

determining if the first image intersects any of the sample locations on each pixel; and

illuminating pixels determined to have at least one sample location that intersects the first image.

2. The method as defined by claim 1 wherein the first image is defined by first image attribute data and first image depth data, the first image depth data defining the depth plane of the first image, the act of illuminating a given pixel comprising:

determining, on the given pixel, if a second image intersects at least one sample location that is intersected by the first image, the second image having second image depth data defining the depth plane of the second image; and

utilizing at least the first image attribute data to illuminate the given pixel if the first image depth data indicates that the first image is at a higher depth plane than the depth plane of the second image for at least one of the intersected sample locations.

3. The method as defined by claim 2 wherein the second image includes second image attribute data, the act of illuminating the given pixel further comprising:

utilizing at least the second image attribute data to illuminate the given pixel if the second image depth data indicates that the second image is at a higher depth plane than the depth plane of the first image for at least one of the intersected sample locations.

4. The method as defined by claim 3 wherein the act of illuminating comprises:

utilizing a weighted average of the first image attribute data and the second image attribute data to illuminate the given pixel.

5. The method as defined by claim 1 wherein attribute data comprises color data.

6. The method as defined by claim 1 wherein the sample patterns include a first sample pattern and a second sample pattern, the first sample pattern having sample locations that are different than the sample locations in the second sample pattern.

7. The method as defined by claim 1 wherein each sample pattern is stored in a look-up table, the act of assigning comprising:

accessing the look-up table to locate the sample pattern for each pixel, the look-up table being accessed for a given pixel based upon the unique location of the given pixel on the display device.

8. The method as defined by claim 7 further comprising:

assigning a random number to each pixel based upon its unique location on the display device; and

utilizing the random number for the given pixel as an index to the look-up table to retrieve the sample pattern for the given pixel.

9. An apparatus for displaying a first image on a display device, the display device having a plurality of pixels, each pixel having a unique location on the display device, the apparatus comprising:

a pattern assignor that assigns one of a plurality of sample patterns to each pixel on the display device, each pixel being assigned the one of a plurality of sample patterns based upon its

unique location on the display device, each sample pattern having at least one sample location;

an image detector operatively coupled to the pattern assignor, the image detector determining if the first image intersects any of the sample locations on each pixel; and

a pixel illuminator operatively coupled with the image detector, the pixel illuminator illuminating pixels determined to have at least one sample location that intersects the first image.

10. The apparatus as defined by claim 9 wherein the first image is defined by first image attribute data and first image depth data, the first image depth data defining the depth plane of the first image, the illuminator comprising:

means for determining, on the given pixel, if a second image intersects at least one sample location that is intersected by the first image, the second image having second image depth data defining the depth plane of the second image; and

means for utilizing at least the first image attribute data to illuminate the given pixel if the first image depth data indicates that the first image is at a higher depth plane than the depth plane of the second image for at least one of the intersected sample locations.

11. The apparatus as defined by claim 10 wherein the second image includes second image attribute data, the illuminator further comprising:

means for utilizing at least the second image attribute data to illuminate the given pixel if the second image depth data indicates that the second image is at a higher depth plane than the depth plane of the first image for at least one of the intersected sample locations.

12. The apparatus as defined by claim 11 wherein the illuminator comprises:

an averaging module that utilizes a weighted average of the first image attribute data and the second image attribute data to illuminate the given pixel.

13. The apparatus as defined by claim 9 wherein attribute data comprises color data.

14. The apparatus as defined by claim 9 wherein the sample patterns include a first sample pattern and a second sample pattern, the first sample pattern having sample locations that are different than the sample locations in the second sample pattern.

15. The apparatus as defined by claim 9 wherein each sample pattern is stored in a look-up table, the pattern assignor comprising:

a look-up table manager that accesses the look-up table to locate the sample pattern for each pixel, the look-up table being accessed for a given pixel based upon the unique location of the given pixel on the display device.

16. The apparatus as defined by claim 15 further comprising:

means for assigning a random number to each pixel based upon its unique location on the display device; and

means for utilizing the random number for the given pixel as an index to the look-up table to retrieve the sample pattern for the given pixel.

17. A computer program product for use with a computer system for displaying a first image on a display device, the display device having a plurality of pixels, each pixel having a unique location on the display device, the computer program product comprising a computer usable medium having computer readable program code thereon, the computer readable program code including:

program code for assigning one of a plurality of sample patterns to each pixel on the display device, each pixel being assigned the one of a plurality of sample patterns based upon its unique location on the display device, each sample pattern having at least one sample location;

program code for determining if the first image intersects any of the sample locations on each pixel; and

program code for illuminating pixels determined to have at least one sample location that

intersects the first image.

18. The computer program product as defined by claim 17 wherein the first image is defined by first image attribute data and first image depth data, the first image depth data defining the depth plane of the first image, the program code for illuminating a given pixel comprising:

program code for determining, on the given pixel, if a second image intersects at least one sample location that is intersected by the first image, the second image having second image depth data defining the depth plane of the second image; and

program code for utilizing at least the first image attribute data to illuminate the given pixel if the first image depth data indicates that the first image is at a higher depth plane than the depth plane of the second image for at least one of the intersected sample locations.

19. The computer program product as defined by claim 18 wherein the second image includes second image attribute data, the program code for illuminating the given pixel further comprising:

program code for utilizing at least the second image attribute data to illuminate the given pixel if the second image depth data indicates that the second image is at a higher depth plane than the depth plane of the first image for at least one of the intersected sample locations.

20. The computer program product as defined by claim 19 wherein the program code for illuminating comprises:

program code for utilizing a weighted average of the first image attribute data and the second image attribute data to illuminate the given pixel.

21. The computer program product as defined by claim 17 wherein attribute data comprises color data.

22. The computer program product as defined by claim 17 wherein the sample patterns include a first sample pattern and a second sample pattern, the first sample pattern having sample locations that are different than the sample locations in the second sample pattern.

23. The computer program product as defined by claim 17 wherein each sample pattern is stored in a look-up table, the program code for assigning comprising:

program code for accessing the look-up table to locate the sample pattern for each pixel, the look-up table being accessed for a given pixel based upon the unique location of the given pixel on the display device.

24. The computer program product as defined by claim 23 further comprising:

program code for assigning a random number to each pixel based upon its unique location on the display device; and

program code for utilizing the random number for the given pixel as an index to the look-up table to retrieve the sample pattern for the given pixel.

25. A method of illuminating a pixel on a display device, the method comprising:

detecting one or more images that intersect the pixel;

providing a data slot for each image that intersects the pixel, each data slot including attribute data and depth data for its image on the pixel;

calculating a weighted pixel attribute average for the attribute data of all slots, the weighted average being calculated each time a new slot is generated; and

utilizing the weighted average to illuminate the pixel each time the weighted average is calculated.

26. The method as defined by claim 25 wherein each slot includes a coverage mask that defines the amount that the image covers the pixel, the weighted pixel attribute average being

based upon the coverage mask in each data slot.

27. The method as defined by claim 26 wherein the pixel includes a plurality of sample locations, each slot including depth data identifying the depth plane of its image, each coverage mask defining any sample locations that are covered by the image, the weighted average being based upon the depth data in each slot if two or more coverage masks indicate that their respective images intersect a common sample location.

28. The method as defined by claim 25 wherein each data slot is stored in memory as a list.

29. The method as defined by claim 25 wherein the pixel includes at least one sample location, each data slot including a coverage mask that identifies each sample location that is covered by its image.

30. The method as defined by claim 29 wherein the display device includes a second pixel having a set of sample locations, the at least one sample location on the pixel being different than the set of sample locations of the second pixel.

31. A method of storing pixel data for illuminating a pixel on a display device, the method comprising:

sampling the pixel to produce a first number of samples;

allocating a given portion of pixel memory for storing pixel data, the pixel data being stored in data slots in the pixel memory, the pixel data in each data slot representing the intersection of one image with the samples, the storage of pixel data in each data slot being based upon the total number of samples;

determining if the given portion of pixel memory is filled; and

reducing the first number of samples if it is determined that the given portion of pixel

memory is filled.

32. The method as defined by claim 31 wherein the given portion of pixel memory is a non-contiguous block of memory.

33. The method as defined by claim 31 wherein the given portion of pixel memory is preconfigured to include a given number of data slots with no pixel data, the given portion of pixel memory being determined to be filled when pixel data is stored in all of the given number of data slots.

34. The method as defined by claim 33 further comprising:

determining that a given image intersects with at least one of the samples;

locating a data slot with no data in the given portion of pixel memory if the given image is determined to intersect at least one of the samples; and

storing pixel data relating to the given image in the located data slot.

35. The method as defined by claim 31 wherein one or more data slots in the pixel memory are made available for storing pixel data as a result of the first number of samples being reduced.

36. The method as defined by claim 31 wherein no pixel data for a given image is stored in a data slot when no samples intersect the given image.

37. The method as defined by claim 31 wherein each data slot includes a coverage mask identifying a set of samples that intersects the image.

38. The method as defined by claim 37 wherein the coverage mask includes a single bit representing each of the samples.

39. The method as defined by claim 31 wherein the pixel data representing the intersection of one image with the samples includes data identifying the total number of samples that are intersected.

40. The method as defined by claim 39 wherein the total number of samples that are intersected ranges from no samples to the first number of samples.

41. An apparatus for storing pixel data for illuminating a pixel on a display device, the display device being coupled with pixel memory, the apparatus comprising:

a sampling module that samples the pixel to produce a first number of samples;

a memory controller operatively coupled with the sampling module, the memory controller allocating a given portion of pixel memory for storing pixel data, the pixel data being stored in data slots in the pixel memory, the pixel data in each data slot representing the intersection of one image with the samples, the storage of pixel data in each data slot being based upon the total number of samples, the memory controller determining if the given portion of pixel memory is filled; and

a sample reduction module operatively coupled with the memory controller, the sample reduction module reducing the first number of samples if it is determined that the given portion of pixel memory is filled, at least a portion of the given portion of pixel memory becoming available as a result of the first number of pixels being reduced.

42. The apparatus as defined by claim 41 wherein the given portion of pixel memory is a non-contiguous block of memory.

43. The apparatus as defined by claim 41 wherein the given portion of pixel memory is preconfigured to include a given number of data slots with no pixel data, the given portion of pixel memory being determined to be filled when pixel data is stored in all of the given number

of data slots.

44. The apparatus as defined by claim 43 further comprising:

means for determining that a given image intersects with at least one of the samples;

means for locating a data slot with no data in the given portion of pixel memory if the given image is determined to intersect at least one of the samples; and

means for storing pixel data relating to the given image in the located data slot.

45. The apparatus as defined by claim 41 wherein one or more data slots in the pixel memory are made available for storing pixel data as a result of the first number of samples being reduced.

46. The apparatus as defined by claim 41 wherein no pixel data for a given image is stored in a data slot when no samples intersect the given image.

47. The apparatus as defined by claim 41 wherein each data slot includes a coverage mask identifying a set of samples that intersects the image.

48. The apparatus as defined by claim 47 wherein the coverage mask includes a single bit representing each of the samples.

49. The apparatus as defined by claim 41 wherein the pixel data representing the intersection of one image with the samples includes data identifying the total number of samples that are intersected.

50. The apparatus as defined by claim 49 wherein the total number of samples that are intersected ranges from no samples to the first number of samples.

51. A computer program product for use with a computer system for storing pixel data for illuminating a pixel on a display device, the computer program product comprising a computer usable medium having computer readable program code thereon, the computer readable program code including:

program code for sampling the pixel to produce a first number of samples;

program code for allocating a given portion of pixel memory for storing pixel data, the pixel data being stored in data slots in the pixel memory, the pixel data in each data slot representing the intersection of one image with the samples, the storage of pixel data in each data slot being based upon the total number of samples;

program code for determining if the given portion of pixel memory is filled; and

program code for reducing the first number of samples if it is determined that the given portion of pixel memory is filled, at least a portion of the given portion of pixel memory becoming available as a result of the first number of pixels being reduced.

52. The computer program product as defined by claim 51 wherein the given portion of pixel memory is a non-contiguous block of memory.

53. The computer program product as defined by claim 51 wherein the given portion of pixel memory is preconfigured to include a given number of data slots with no pixel data, the given portion of pixel memory being determined to be filled when pixel data is stored in all of the given number of data slots.

54. The computer program product as defined by claim 53 further comprising:

program code for determining that a given image intersects with at least one of the samples;

program code for locating a data slot with no data in the given portion of pixel memory if the given image is determined to intersect at least one of the samples; and

program code for storing pixel data relating to the given image in the located data slot.

55. The computer program product as defined by claim 51 wherein one or more data slots in the pixel memory are made available for storing pixel data as a result of the first number of samples being reduced.

56. The computer program product as defined by claim 51 wherein no pixel data for a given image is stored in a data slot when no samples intersect the given image.

57. The computer program product as defined by claim 51 wherein each data slot includes a coverage mask identifying a set of samples that intersects the image.

58. The computer program product as defined by claim 57 wherein the coverage mask includes a single bit representing each of the samples.

59. The computer program product as defined by claim 51 wherein the pixel data representing the intersection of one image with the samples includes data identifying the total number of samples that are intersected.

60. The computer program product as defined by claim 59 wherein the total number of samples that are intersected ranges from no samples to the first number of samples.

61. A method of storing pixel data for illuminating a given pixel on a display device, the display device including a plurality of pixels, the method comprising:

sampling the given pixel to produce a first number of samples, at least one of the samples being intersected by a given image;

allocating a given portion of pixel memory for storing pixel data for any image that

intersects any of the plurality of pixels on the display device;

determining if the given portion of pixel memory is filled with pixel data;

reducing the first number of samples if it is determined that the given portion of pixel memory is filled with pixel data, at least a portion of the given portion of pixel memory becoming available as a result of the first number of pixels being reduced; and

storing pixel data relating to the given pixel in the given portion of the pixel memory.

62. The method as defined by claim 61 wherein the pixel memory includes a plurality of data slots for storing pixel data, the pixel data relating to the given pixel being stored in a data slot.

63. An apparatus for storing pixel data for illuminating a given pixel on a display device, the display device including a plurality of pixels, the apparatus comprising:

a sampling module that samples the given pixel to produce a first number of samples, at least one of the samples being intersected by a given image;

a memory controller operatively coupled with the sampling module, the memory controller allocating a given portion of pixel memory for storing pixel data for any image that intersects any of the plurality of pixels on the display device, the memory controller also determining if the given portion of pixel memory is filled with pixel data;

a sample reduction module operatively coupled with the memory controller, the sample reduction module reducing the first number of samples if it is determined that the given portion of pixel memory is filled with pixel data, at least a portion of the given portion of pixel memory becoming available as a result of the first number of pixels being reduced; and

a pixel data storage module operatively coupled with the memory controller, the pixel data storage module storing pixel data relating to the given pixel in the given portion of the pixel memory.

64. The apparatus as defined by claim 63 wherein the pixel memory includes a plurality of

data slots for storing pixel data, the pixel data relating to the given pixel being stored in a data slot.

65. A computer program product for use on a computer system for storing pixel data for illuminating a given pixel on a display device, the display device including a plurality of pixels, the computer program product comprising a computer usable medium having computer readable program code thereon, the computer readable program code including:

program code for sampling the given pixel to produce a first number of samples, at least one of the samples being intersected by a given image;

program code for allocating a given portion of pixel memory for storing pixel data for any image that intersects any of the plurality of pixels on the display device;

program code for determining if the given portion of pixel memory is filled with pixel data;

program code for reducing the first number of samples if it is determined that the given portion of pixel memory is filled with pixel data, at least a portion of the given portion of pixel memory becoming available as a result of the first number of pixels being reduced; and

program code for storing pixel data relating to the given pixel in the given portion of the pixel memory.

66. The computer program product as defined by claim 65 wherein the pixel memory includes a plurality of data slots for storing pixel data, the pixel data relating to the given pixel being stored in a data slot.

67. A pixel data storage apparatus for storing pixel data for a given pixel on a display device, the pixel data storage apparatus storing pixel data for a given image that intersects the given pixel, the given pixel having one or more sample locations, the pixel data storage apparatus comprising:

a coverage mask that stores intersection information relating to the sample locations

intersected by the given image;

an attribute data field that stores attribute data for the given image; and

a pointer that points to one of a terminator value and another pixel data storage apparatus.

68. The pixel data storage apparatus as defined by claim 67 wherein the terminator value is a null value.

69. The pixel data storage apparatus as defined by claim 67 wherein the attribute data includes depth data relating to the depth of the given image.

70. The pixel data storage apparatus as defined by claim 67 wherein the attribute data includes color data relating to the color of the given image.

71. The pixel data storage apparatus as defined by claim 67 wherein each sample location has an associated bit in the coverage mask.

72. The pixel data storage apparatus as defined by claim 67 further including a sample reduction field for storing data indicating that the total number of sample locations is less than a maximum number of samples.

73. A graphics processor, for use with a computer system, for generating antialiased graphical images, the computer system having a central processing unit, a display device, and a system bus for coupling the graphics processor with the central processing unit and the display device, the display device including a plurality of pixels, the graphics processor comprising:

a system bus interface that receives polygon data from the central processing unit, the polygon data including vertex data that defines a polygon;

a subpixel sample location generator for generating a plurality of sets of subpixel sample

locations, each set of subpixel sample locations being associated with one of the pixels and having values that are dependent upon the location of the associated pixel; and

a rasterizer that receives the polygon data and determines, by accessing the memory, which of the subpixel sample locations on each pixel are covered by the polygon.

74. The graphics processor as defined by claim 73 wherein the subpixel sample location generator defines a plurality of subpixel regions on each pixel, further wherein each subpixel region in a given pixel includes one of the subpixel sample locations in one set of subpixel sample locations.

75. The graphics processor as defined by claim 73 wherein the rasterizer includes a pixel value determiner that determines the color value of each pixel on the display device.

76. The graphics processor as defined by claim 73 wherein the pixels having sample locations that are covered by the polygon are included in a set of pixels, the rasterizer determining pixel attributes of each pixel in the set of pixels based upon the number of covered sample locations within each pixel.

77. The graphics processor as defined by claim 76 wherein the attributes include color, transparency and intensity information.

78. The graphics processor as defined by claim 77 wherein the attributes include depth coordinate information.

79. The graphics processor as defined by claim 73 wherein the subpixel sample location generator includes a look-up table.

80. The graphics processor as defined by claim 73 wherein the sets of subpixel sample locations are identical for selected pixels on the display device.

81. The graphics processor as defined by claim 80 wherein the sets of subpixel sample locations are different for selected pixels on the display device.

82. The graphics processor as defined by claim 73 wherein the rasterizer rasterizes pixels having different sets of subpixel sample locations.

83. The graphics processor as defined by claim 73 wherein the rasterizer processes first and second pixels having different sets of subpixel sample locations.